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SOVIET RESEARCH ON PENICILLIN DEPOT IN THE ORGANISM

S. Ye. Tkachev, Cand Med Sci

The effectiveness of penicillin depends to a great extent upon the length of its retention in the human body. Previously, intramuscular injection remained effective for only 3-4 hr, so that the treatment had to be repeated eight times during a 24-hr period. In 1947, M. Kh. Berghol'ts mixed penicillin with peach oil, adding 2% of beeswax to the oil. Using this method to administer 10,000 units, he found that the concentration in the blood increased for 12 hr, after which it dropped. In N. N. Petrov's clinic, 20,000 units were dissolved in one ml of a 0.5-2% novocain solution. This was mixed with one ml of the patient's blood and given to him intravenously. By this method, the patient received only two injections in 24 hr. M. V. Troitskiy discovered that penicillin given with blood and novocain could still be detected in the urine within 24 hr.

Upon instruction by the Ministry of Public Health, experiments were undertaken trying to extend the retention time of penicillin by mixing it with pyramidon, novocain, blood, and by cupping prior to administration. The effectiveness of the creation of various types of penicillin "depots" with the help of cold applications, venous blood congestion in the zone where the preparation is applied, blends of penicillin with adrenalin, pyramidon, beeswax, and with aqueous emulsions of peanut oil, amply justifies the use of these methods, because retention of the preparation in the organism is often insured for as much as 24 hr.

S. I. Banaitis expressed the belief that retention of penicillin depends on the protein medium in which the penicillin is introduced into the organism. On the strength of this, the Banaitis clinic centered its work around new methods of combining penicillin with various sera. At the same time, Prof I. V. Danilov and A. S. Rovnov (Central Institute for Advanced Training of Physicians) started experimenting with antitetanus serum. V. A. Dolinin found that by combining penicillin with antitetanus, antigangrene, or species-nonspecific serum of N. G. Belen'kiy, the antibiotic activity against various standard

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staphylococci was increased. The Banaitis clinic used 150,000-200,000 units of penicillin in 5 ml of serum. Injections were given twice in 24 hr at 12-hr intervals. It was found that after 6 hr, there remained a concentration of 0.6 unit per ml of blood, and after 12 hr, the concentration was 0.02 to 0.04 unit per ml of blood. Danilov and Rovnov found that after a single application of 200,000 units of penicillin in 3,000 units of antitetanus serum, the antibiotic retained a concentration of no less than 0.03 unit per ml of blood serum after 36 hr. These investigators emphasize that mixing the preparation with antitetanus serum immediately before injection does not decrease its effectiveness; however, the effectiveness decreases sharply if the mixture is stored a few days in hermetically sealed containers.

The method recommended by Banaitis, Danilov, and Rovnov appears to be the most advantageous in the opinion of these authors. Danilov and Rovnov consider that antitetanus serum and penicillin together have a good prophylactic effect against various kinds of wound infections, particularly tetanus.

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